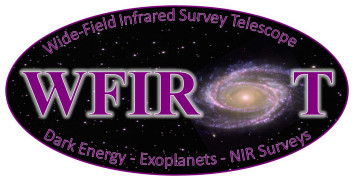


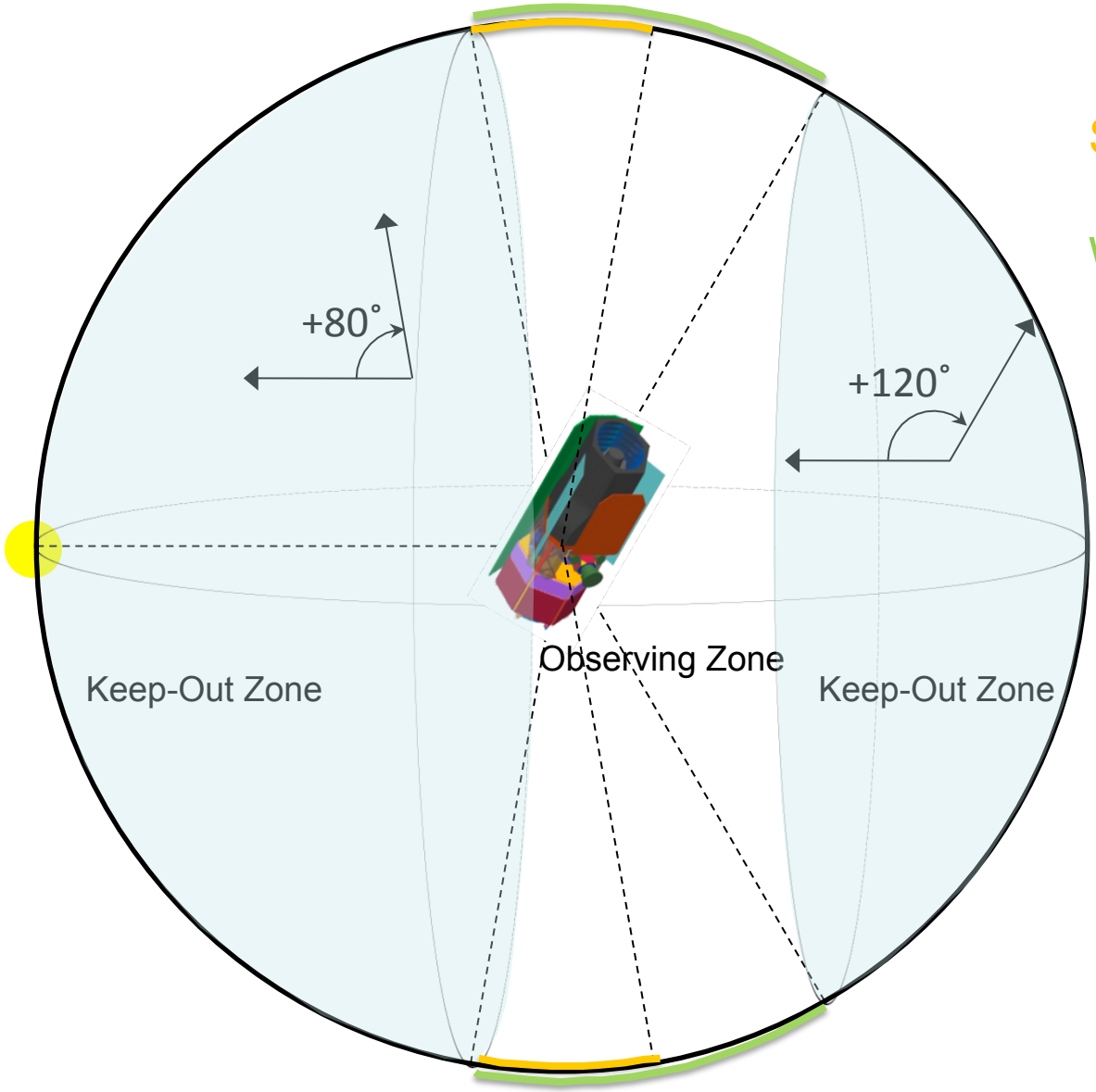
JDEM-Ω Requires Modifications for WFIRST Mission

- NWNW indicates 500-day Microlensing Program
  - only 2 50-day observing windows per year
  - The bulge must be observed whenever it can be
  - Significant “edge effect” penalties for regular interruptions
- 0.5 year SNe program
  - Must sample high-z SNe
  - 160 days between Galactic bulge observing windows is not enough
- Some Modification of JDEM-Ω concept is needed to have a plausible WFIRST concept
  - Solutions are relatively straightforward
  - Otherwise we descope the science with no cost savings

NWNH Time Allocations

- High Latitude Survey : 2 years
- Microlensing Exoplanet Search : 500 days
- SNe Survey : 0.5 years
- GO Programs : 1 year
- Total = 4.868 years
- Unallocated = 48 days
  - Presumably available to Microlensing or SNe programs to make up for observing inefficiencies (10% of microlensing program or 26% of SNe program)

The Problem:
JDEM-Ω Field of Regard



SNe FoR

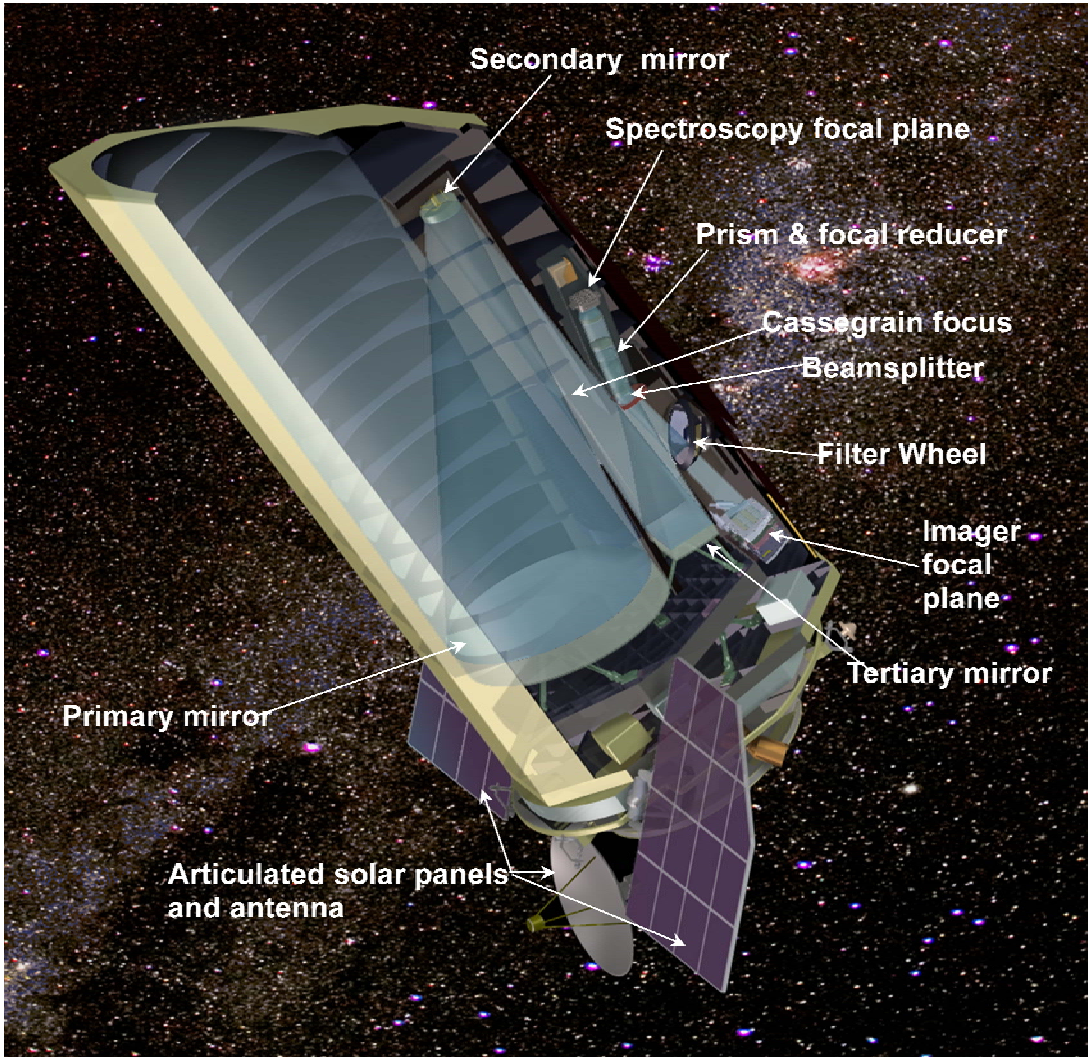
WL/BAO FoR

Possible Solutions

- Extend Bulge observing window to 62.5 days or 61.6°
  - 500 days of microlensing observations in 8 observing seasons
  - Allows 1.33 years of SNe observations without interruption by microlensing program
  - Add 48 unallocated days to make up for “edge” effects
- Extend Bulge observing window to 71.4 days or 70.4°
  - 500 days of microlensing observations in 7 observing seasons
  - Allows 1.80 years of SNe observations without interruption by microlensing program
- Longer Bulge observing windows are desirable
  - More flexibility in scheduling
  - Allows GO observations of bulge and anti-bulge directions
  - To be considered after June report?

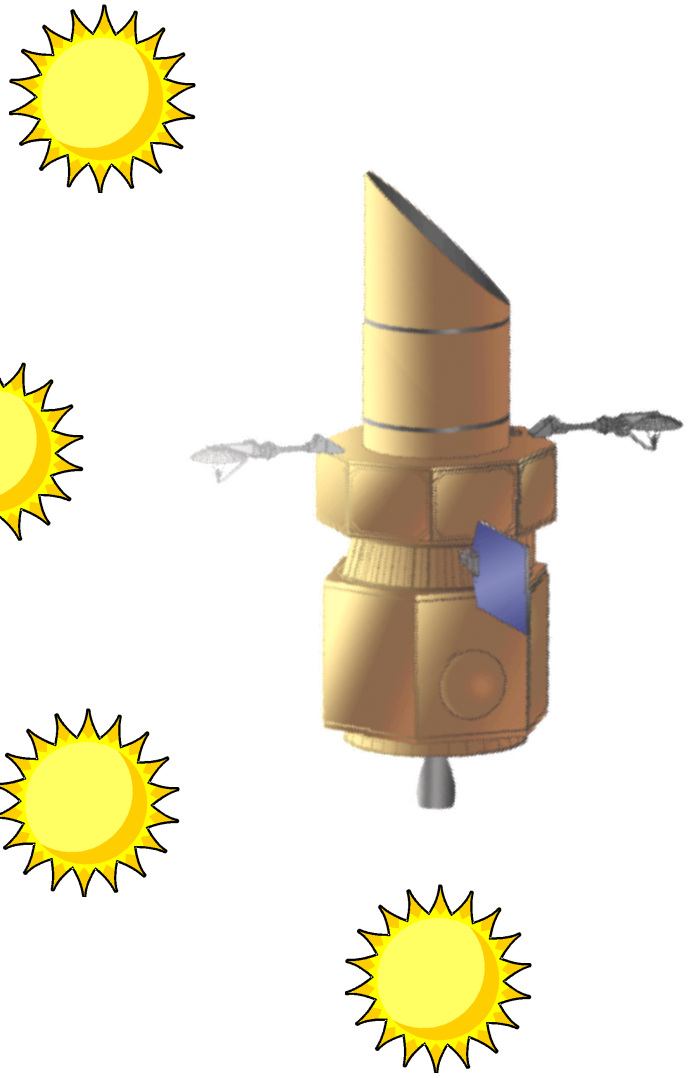
Levi et al. (arXiv.org:1105.0959)

- 270 day bulge observing seasons
- Articulated solar arrays
- Aft sunshield
- Allows exoplanet dominated extended mission, should it be needed (i.e. if HZ proves to be much narrower than current estimates)



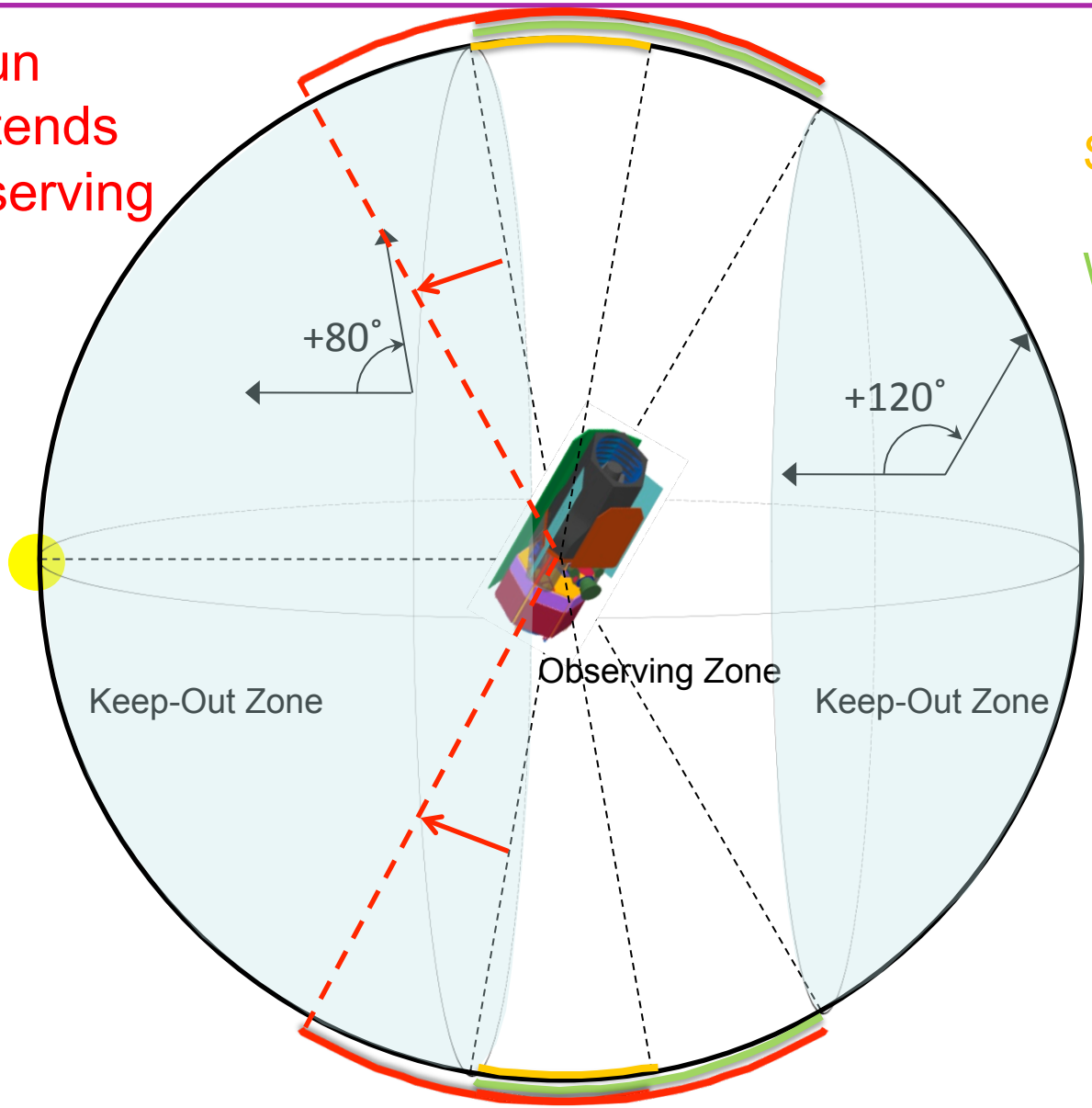
MPF Design

- Solar viewing angle
  - MPF: 45°-180°
- Articulated Solar Arrays
  - Moving parts
  - LMSS : 90 Iridium satellites with no failure
- Larger Sun Shield
- Thermal Design
  - Larger range of solar angles implies thermal control in wider range of solar heating conditions



Payload Central Line of Sight
Field of Regard

Larger Sun shield extends bulge observing window



SNe FoR

WL/BAO FoR

Solar Power Generation

- JDEM-Ω allows ±30° angle between solar arrays and normal to the Sun's direction at end-of-life
- Assume 3.5% solar array degradation per year (MPF)
- Year 5: bulge observed at 60°-120° from the Sun: 2×60.8 days
- Year 4: bulge observed at 56.7°-123.3° from the Sun: 2×67.5 days
- Year 3: bulge observed at 53.8°-126.2° from the Sun: 2×72.4 days
- Year 2: bulge observed at 51.1°-128.9° from the Sun: 2×78.9 days
- Year 1: bulge observed at 48.7°-131.3° from the Sun: 2×83.7 days

- 7 microlensing seasons: Years 1-2, 4.5-5 = 514.3 days
- So, power for 500 days of microlensing observations in 7 seasons seems sufficient
- If we extend the Sun shields for the telescope and (possibly) the aft electronics boxes.

WFIRST Filters

- 7 filter slots: 5 filters, 1 prism, 1 opaque filter for calibrations
  - Exoplanet program wants to define 1 of 7 filters
- NWNH : exoplanet program “of equal importance” to dark energy
  - although requirements are mostly weaker
- NWNH : exoplanet science equivalent to ½ of expected output of MPF
- Current 1.3m off-axis design should be close to this (with 4×7 imager)
  - Perhaps 10% better, perhaps not
  - Estimated 40% hit from using the best WL filter
- Using the wide Microlensing Filter is the only option to achieve WFIRST Science
  - New detailed calculations in ~1 week